Stroke

Definition: Loss of muscle function, vision, sensation or speech, resulting from brain cell death. Ischemic stroke, about 80% of all stroke, is caused by a severe reduction in blood supply to part of the brain. Blood flow becomes obstructed due to blockage of an artery by atherosclerosis or by bits of debris (emboli) transported through the bloodstream, usually from the heart.
ICD-9 codes 430-438.

Summary

Stroke accounted for 3,135 deaths in Washington in 1994 (age-adjusted death rate: 26.5 per 100,000). Stroke is the third most common cause of death and a leading cause of disability in Washington and in the United States. Many strokes may be prevented by reducing the risk factors for atherosclerosis, including high blood pressure, physical inactivity, and cigarette smoking. Specific interventions for stroke prevention in high risk populations are currently under investigation.

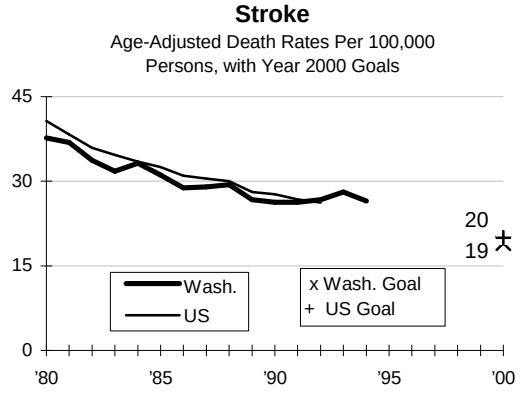
Time Trends

In the United States, stroke mortality fell by 36% between 1980 and 1992. Washington State rates show a similar, though less steep, downward trend, with no improvement since the late 1980s.

The declines in stroke mortality are largely due to the control of hypertension, to secondary prevention of stroke among patients with early signs of impending stroke and, to a lesser extent, to the decline in cigarette smoking. Advances in medical therapy have also resulted in higher survival rates following stroke.

Year 2000 Goal

Washington's goal for the year 2000 is an age-adjusted stroke death rate of 19/100,000 or lower.



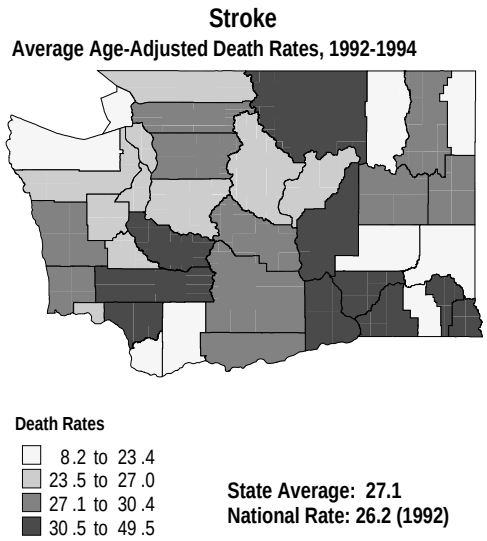
The 1994 Washington rate was 26.5/100,000. Recent trends suggest that additional prevention efforts may be needed to achieve a decline in mortality rates in the future.

Geographic Variation

The map below displays age-adjusted mortality due to stroke by county for 1992-1994. It is important to note that for some counties the rates are based on small numbers of deaths and are subject to considerable year-to-year fluctuation. The counties with the highest rates were Garfield, Cowlitz, Lewis, Walla Walla, Asotin, Franklin, Pierce, Benton, Grant, and Okanogan. The counties with the lowest rates were Skamania, San Juan, Adams, Pend Oreille, Clallam, Columbia, Whitman, Clark, Ferry, and Island.

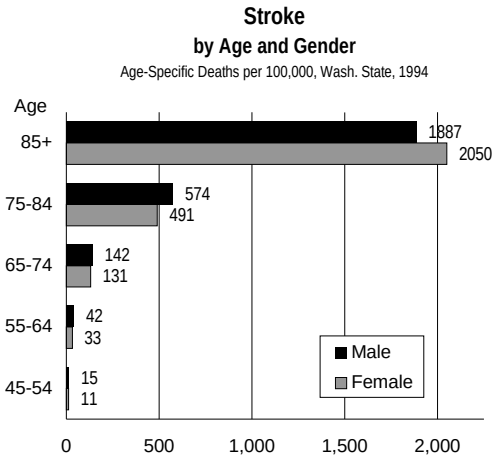
Age and Gender

Stroke may occur at any age, but is primarily a disease of the elderly. Starting at age 55, annual age-specific stroke mortality increases dramatically with age. As the proportion of older adults in the



population increases in the coming years, reductions in stroke mortality will be more difficult to achieve.

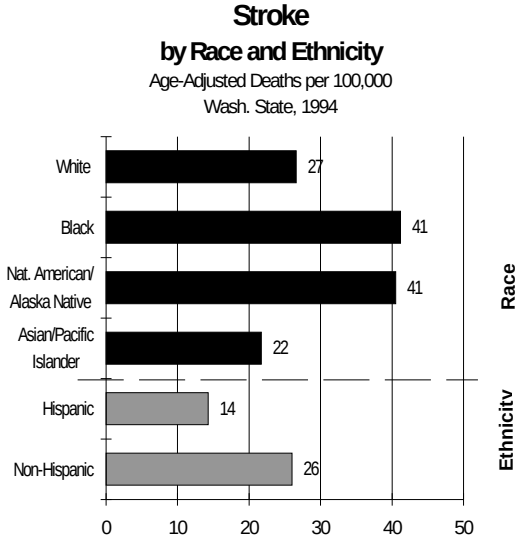
Substantially more Washington women die of stroke each year than men: nearly 60% more in 1994. Due to the higher proportion of women living beyond age 65, this fact is not reflected in higher age-specific death rates, except in the oldest age group. Men nationally have about a 16% higher age-adjusted stroke mortality rate than women. [1]



Race and Ethnicity

African American stroke mortality is substantially higher than that among Caucasians. Nationally, the ratio is most pronounced for African American men between 35 and 44 years of age, whose death rate from stroke is five times that of their Caucasian counterparts.[2] This reflects the high prevalence of hypertension in African American males. Native Americans also experience higher stroke mortality than Caucasians.

Washington state data for 1994 differ somewhat from the national pattern. Stroke mortality for native Americans is higher, and that for Hispanics lower, compared to other racial and ethnic groups than is the case nationwide.



Income and Education

Studies of King County residents have shown higher rates of stroke mortality in geographic areas in which a large percentage of people live below the poverty level. No data are available on the relationship between education level and stroke mortality rates.

Other Measures of Impact and Burden

Incidence. In 1993, an estimated 500,000 Americans suffered strokes, 149,740 of them fatal.[3] Stroke incidence increases sharply with age, doubling in each decade after age 45. Stroke incidence among US men is 19% higher than among women. As the US population ages, the incidence of stroke is expected to increase. No Washington state specific data on stroke incidence are available.

Prevalence. Each year from 1980 to 1989, two to three million persons in the US were living with diagnosed cerebrovascular disease, either having a stroke or developing symptoms of an impending stroke.[3] The prevalence of nonfatal stroke increased with successive age groups. The prevalence of nonfatal stroke is higher for black adults than white adults and higher for men than for women. Also, persons who have experienced a stroke have a high probability of a second brain infarction, with a five year cumulative recurrence rate of 40% for men and 20% for women. No Washington state specific data are available on the prevalence of stroke.

Hospitalization. In 1994, 11,733 acute care hospital admissions were recorded among Washington residents for stroke, an admission rate of 220 per 100,000 persons. This is a slight decline from the 1990 rate of 226/100,000. Stroke accounted for 58,769 hospital days in 1994, with total related charges of over $98.6 million. This does not include the extensive long-term care required by many stroke survivors.

Disability and Quality of Life. There are an estimated 3 million plus stroke survivors alive in the United States today.[4] Many of them suffer from disabilities, including long term loss of functional capacity in areas vital to normal daily activities. "Stroke can rob a person of locomotion, vision, language, and cognition, and thereby of independence, and may mark the end of active life."[5]

Co-Outcomes. Atherosclerosis, the pathological process underlying the majority of strokes, occurs throughout the arterial blood system. It may produce disease in the heart, peripheral vascular system, or kidneys, as well as in the central nervous system.

Risk and Protective Factors

The most important modifiable risk factor for stroke is high blood pressure. In addition, stroke shares two other risk factors for atherosclerosis with coronary heart disease: smoking and physical inactivity.

A number of other factors are also associated with an increased risk of stroke, including known heart disease, high blood cholesterol and abnormal glucose tolerance (often a precursor to diabetes), and alcohol consumption. These risk factors appear exert their effects through or in conjunction with the independent risk factors noted above.

High Blood Pressure. The presence of uncontrolled hypertension more than triples individual's risk of stroke. Population-wide control of elevated blood pressure would result in an estimated decrease in the incidence of both fatal and nonfatal strokes of over 30%.[6]

Smoking. Cigarette smoking is most strongly associated with stroke risk for people under age 55. For women who use oral contraceptives, smoking sharply increases the risk of stroke.

Physical Inactivity. Physical inactivity doubles an individual's risk for stroke. The role of physical activity in stroke prevention may be through its contribution to the management of high blood pressure, as well its effect in controlling atherosclerotic arterial disease.

High Blood Cholesterol. High total cholesterol levels are probably a risk factor for stroke. Control of high blood cholesterol probably indirectly decreases the risk of stroke as well as heart disease. The effect of lowering high blood cholesterol on stroke risk needs further study.

High Risk Groups

Elderly persons. Stroke is mainly a problem of the elderly, with the majority of strokes occurring after age 60. Contributing to this is the prevalence of hypertension. An estimated 60% of all Americans age 70 and older have high blood pressure, compared to 25% of the total population.

African Americans. The highest mortality rates for stroke in the US are found among African American men. African Americans have a higher prevalence of high blood pressure, develop it an earlier age and tend to have more severe hypertension than Caucasians.

People with diabetes. Stroke occurs two to six times more often among people with diabetes. Women experience a greater increase in stroke risk due to the presence of diabetes than do men.

Previous history of stroke. In the five years following a stroke, 40% of men and 20% of women will experience a second stroke. Recurrent strokes are more common when heart disease and hypertension were present prior to the initial stroke.

Known heart disease. Persons with existing coronary heart disease are twice as likely to have a stroke as those without heart disease.

Atrial fibrillation. People with atrial fibrillation, a type of irregular heart rhythm, have a higher risk of suffering from embolic strokes resulting from blood clots which form in the heart and travel to the brain. About 15% of strokes occur in people with atrial fibrillation.

Intervention Points, Strategies and Effectiveness

Few population-based interventions targeted specifically at stroke prevention have been implemented and evaluated. The National Heart, Lung and Blood Institute is currently conducting a large scale stroke intervention program in the 11

southeastern states with the nation's highest stroke rates. Future recommendations for public health interventions are anticipated when this study, the Stroke Belt Initiative, is completed.

In the meantime, interventions focused on various stroke-related risk factors provide the best-available approach. These interventions are discussed in other sections of this report. Public health strategies aimed at improving the detection, diagnosis and control of high blood pressure have the biggest role to play in stroke prevention. Assurance of blood pressure control among people known to have hypertension is a particularly challenging but important component of these strategies. This involves measures to improve adherence to lifestyle[7] and pharmacologic[8] blood pressure control techniques.

The value of risk factor-based preventive measures in persons with known cerebrovascular disease or a previous stroke has not been established as clearly as it has for coronary heart disease. However, since atherosclerosis is the common underlying pathological process for both diseases, risk factor management after a stroke is likely to help prevent recurrence.

Certain medical interventions are of proven value for stroke prevention in individuals with specific risk factors. In people with known atrial fibrillation, treatment with medications to prevent the formation of blood clots is of proven value in preventing embolic strokes. Also, surgery on atherosclerotic carotid arteries (which supply blood to the brain) is being used increasingly in selected situations, particularly those where "warning signs" of stroke have occurred.

Further work is needed to determine the value of routine screening for atrial fibrillation and screening for carotid artery disease as public health strategies for stroke prevention. Another question is the value of public education regarding the early indications of impending stroke as a means to increase early detection and prompt medical intervention.

See related sections on Coronary Heart Disease, Diabetes , High Blood Cholesterol, High Blood Pressure, Physical Inactivity, and Tobacco Use and Exposure.

Data Sources

State death data: Washington Department of Health, Center for Health Statistics

National death data: National Center for Health Statistics

State hospitalization data: Comprehensive Hospital Abstract Reporting System (CHARS)

For More Information

Washington State Heart Disease and Stroke Prevention Plan, Washington Department of Health, February 1995
Washington Department of Health, Heart Health Program (360) 586-6091.

Technical Notes

Age adjustment: See technical appendix.

Race and ethnicity: See technical appendix.

Endnotes:

---

[1] Brownson, R., P. Remington and J. Davis (Editors) Chronic Disease Epidemiology and Control. Washington, D.C. American Public Health Association 1993. 95-107

[2] Centers for Disease Control and Prevention, Division of Chronic Disease Control and Community Intervention. Cardiovascular Disease Surveillance: Stroke, 1980-1989. Atlanta, GA. US Department of Health and Human Services. 1994

[3] American Heart Association. "Heart and Stroke Facts: 1996 Statistical Supplement." AHA, Dallas, TX, 1995.

[4] Wolf, P A. "Epidemiology of Stroke", in Pearson, T., M. Criqui, R. Luepker, Al Oberman, M. Winston (Editors) Primer in Preventive Cardiology. Dallas, TX, American Heart Association, 1994. 67-81

[5] Ibid.

[6] Ibid.

[7] US National Heart, Lung and Blood Institute, National High Blood Pressure Education Program, Working Group Report on Primary Prevention of Hypertension, US Department of Health and Human Services, May 1993. NIH No. 93-2669, Arch. Internal Medicine, 1993;153:186-208.

[8] US National Heart, Lung and Blood Institute, National High Blood Pressure Education Program. The Fifth Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure (JNC V), Washington, D.C. US Department of Health and Human Services NIH 93-1088. Arch. Internal Medicine 1993; 153:154-183.